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## HOME RECORDING AS A HOBBY PROVIDES ENDLESS INTEREST

by

-- IVOR MORGAN - VK3DH --

These are the words of one of our faithful advertisers, who's product appears on the inside back cover page of "Amateur Radio" and I claim no originality for the statement but wish to vouch for the authenticity of same.

"Home Recording" is an expression which, when applied to the experiments and efforts of the average Ham, may be somewhat vague since the Ham, as I know him, usually wants to delve just a little more deeply into his pet branch of interest, than perhaps the ordinary person.

In comparatively recent years much progress has been made in the art of so-called direct or instantaneous recording of sounds on discs. Briefly this system differs from what is generally termed commercial recording, in that, the former is a finished record immediately after cutting and may be played there and then, but the latter starts with a soft wax, which requires processing before it may be played back. The processing business is quite an industry in itself, consisting of several positive-negative reversals which are performed electro-chemically, and we will not concern ourselves with the subject in this discussion.

Instantaneous recording was almost exclusively done on aluminium discs a few years back, but later a series of coated discs were developed by various manufacturers, some on aluminium bases, others on glass and recently on steel bases.

About twelve years ago I conducted a number of experiments with the system of direct recording on aluminium with results which we, at the time, considered to be quite fair, but which suffered from several limitations, not the least of which was the difficulty of a reliable play back. Even if the main import requirements, such as a smooth running turntable and a good tracking pick-up together with a sharp and correctly shaped fibre or steel needle were provided, the reliability of play back was still poor.

To explain this difficulty as briefly as possible it must be considered that when recording on aluminium the track is "scribed" on the blank face of the disc and not "cut" as in the case of a wax or acetate coated disc. This sound track on the aluminium disc therefore consists of a correctly shaped groove with a "wall" on either side formed by the metal which is pushed up on either side of the recording needle. This wall is, from a cross-section point of view, higher than the original level of the blank surface. It will therefore be seen that when we play back our recording the needle of our pick-up has the choice of "tracking" in one of two tracks on the disc, the first being the correct one (that made by the recording needle) and the second being a track formed by adjacent walls of the correct sound track. If one is lucky the play back needle may start off correctly and run all the way in the right track, but it sometimes happens that when a loud passage occurs in the sound, the needle jumps to the wrong track resulting in a very distorted reproduction accompanied by an echo effect from the turn before or after that which the pick-up needle is "trying" (?) to follow.

Other difficulties associated with this method are the power required both in the driving motor for the recording turn-table and the amplifier driving the cutting head. It is usually necessary to weight the cutting head to the order of about fourteen ounces to allow the recording needle to make a sufficiently deep track, resulting in a comparatively heavy load on the revolving turn-table and also a considerable damping effect on the armature of the recording head necessitating an increase in audio frequency watts to drive same.

These are some of the more serious difficulties which help to hold your efforts to make a respectable recording at a low standard.

The considerably more modern system of cutting a continuous thread from a sime-hard coating leaving a clean polished groove with a clear area of "land" between, completely eliminates the problem of play back needle running in the wrong track whilst the mechanical power required to rotate the turntable is much less and the cutting head armature is not "damped" as much when "cutting" a comparatively soft material with a sharp edge at a weight of only two to four ounces.

There are many forms and qualities of blank discs on the market at the present time, which make it an easy job to produce an entirely satisfactory recording which will compare more than favourably with the recognized commercial stock pressing, mainly in signal to noise ratio in the reproduced result. Since commercial interests have far more scope than the Ham to produce a better frequency characteristic we make no comment on that, but

as the stock from which commercial pressings are made contains an abrasive and the instantaneous type recording blank is of very fine granular structure, the familiar "scratch" level may be very much lower with the same "signal" level.

Opinions differ greatly as to which is the ideal make or type of blank, but suffice to say that the brand marketed by our aforementioned advertiser contains some fifty-two odd ingredients and is the result of years of research. In a few words the material is usually mainly composed of a cellulose mixture containing an oil soluble in amyl acetate and combined to form a coating on aluminium, glass, papiermache or steel which will not set hard when dry, as in the case of duco mixtures, but assume a semi-hard form which when cut by a polished steel, diamond or sapphire cutting point, leaves a polished groove.

With regard to mechanical means necessary to perform the all important spiral track on the blank disc, there are several excellent types now available for home use and I would not attempt to describe a method of construction without a number of complicated diagrams which are not altogether convenient for our Magazine in its present form.

However, the important points to consider, from some experience which I have gained, appear to be firstly, a smooth running turntable, which is true on its shaft and driven by a motor with ample power to overcome varying loads and thus ensure against any "wow" troubles. (Change of table speed during cutting.)

Reasonable quality cutting heads are available together with the tracking gear or the latter may be made or obtained separately and a magnetic pick-up adapted as a cutting head. Tracking gear and lead screw assembly which obtains its drive from the centre shaft of the turntable appears to be most suitable for home use and that illustrated on the inside back cover of "Amateur Radio" is ideal in every way. There are many other ways of achieving the object of feeding the cutting head across the disc either from the centre to the outside or vice versa, and some prefer a separate drive from the source of power to the lead screw which would be some distance from the turntable, and drive a carriage holding the cutter along a radius of the disc. This system has the advantage that the centre shaft is clear at all times and the cuttings may be swept to the centre and continuously cleared from the cutting head. The main difficulty with this construction is the absolute necessity of a very solid chassis construction between turntable shaft bearing and lead screw mounting and carrier, in order to prevent any small movement being mechanically magnified and resulting in "twinning" or uneven spacing of the grooves on the finished disc.

It is generally accepted that for best quality results the amplifier should be capable of producing about three times as much power as would be required to drive the cutter when fully

modulating the recorded track. The required power varies from about two to seven watts according to the cutting head, therefore the amplifier should be capable of approximately ten to twelve watts of undistorted output which would accommodate most types of cutting head.

For most types of disc and cutting needles either steel or sapphire the cutting angle should be between three and ten degrees from the vertical so as to present a slight trailing effect between the needle point and the disc surface.

It seems that the space available is somewhat out of proportion to the size of the subject when one sets out to write down what was calculated to be a short discussion on home recording. Therefore we may be able to select, at a later date, a "department", so to speak of the recording subject and make a more detailed and close examination of its features.

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-- A TRIBUTE --

The Editor,  
Amateur Radio.

Dear Sir,

Under the heading of "Silent Key" in the May issue, the announcement was made of the passing of my old friend and co-member of the old Leichhardt Radio Club, Bill Manley VK2XH.

It was my honour and privilege to have been the founder and first secretary of the Leichhardt and District Radio Society, to give it its full title, and although over twenty years have passed since those flourishing days of Radio Club activity, I have very vivid memories of Bill's enthusiasm and good humour. He was a real "Ham" in every sense of the word, and I know that his loss will be mourned not only by members of the Gladesville Radio Club, of which body he was President, but by those fellow members of the Leichhardt Club with whom he was associated.

Yours faithfully,

William J. Zech.

VK2ACP -- ex VK2WZ

CONVERTER TUBES FOR SHORT WAVE OPERATION

OSCILLATOR FREQUENCY STABILITY -

On the broadcast band a good receiver may be tuned in as soon as the valves commence to operate, and the tuning need not be further adjusted so long as the set is operating. The position on the short wave bands is entirely different, and it is usually necessary to adjust the tuning several times during the first half hour, and occasionally thereafter. There may be causes of this frequency drift, all unfortunately additive. They may for convenience, be separated into:-

- (a) Internal valve changes
- (b) Changes in other components

In most cases the valve is only minor cause of the drift, which is largely the result of the use of bakelite and other unsuitable materials in the oscillator circuit. If all the unsatisfactory insulating materials were removed from the oscillator circuit and replaced with trolitul, steatite, isolantite, or other good ceramics, the frequency drift will be much reduced. Further improvement is possible by removing as far as possible, all sources of heat likely to raise the temperature of the oscillator coil, the condensers in the tuned circuit, the wave-change switch or the valve socket. Some elaborate receivers even go to the extent of removing the power supply completely from the receiver chassis so as to eliminate the major sources of heat. Even if this is not done, it is possible to make considerable improvements to the components and the chassis layout as indicated below:-

- (a) Increase the efficiency of the power transformer so as to decrease the losses which must be dissipated as heat.
- (b) Mount the power transformer on light legs so as to give the minimum metallic heat conduction and maximum air circulation.
- (c) Mount all heat dissipating components above the chassis, with allowance for air circulation.
- (d) Mount all valves at the rear of the chassis so as to have the best possible air circulation.
- (e) Mount the converter valve in a special can designed for maximum air circulation. In many cases it will be found possible to omit any top cover of this can and so improve the air circulation.
- (f) Mount the valve socket so as not to be in direct contact with the chassis e.g. on rubber grommets.
- (g) Avoid the use of bakelite and similar materials in the coils wave-change switch, and valve socket.
- (h) Avoid the use of insulated "hook-up" wire in the oscillator circuit. Bare wire is to be preferred.
- (i) Reduce to the minimum all heat dissipation in voltage dividers and dropping resistors.

- (j) Reduce the heat dissipation in the rectifier valve by using a low impedance type (e.g. 6X5GT for small receivers and 5V4G in large receivers).
- (k) Reduce the heat dissipation in the power valve by using a type having small heater dissipation (e.g. 6V6G) and reduce the plate dissipation as far as practicable.

It will be seen that some of these improvements are not practicable in a small table receiver, but all are worthy of consideration by a receiver designer.

When these matters have been dealt with, it will probably be found that the valve is then an important cause of frequency drift and the logical step is to make such improvements as are practicable. It seems that the whole of the frequency drift due to the converter valve is the result of heat (a) from the heater (b) from the electrodes (c) from the socket and (d) from surrounding components.

The choice of a converter valve should be influenced by items (a) and (b) while the heat from the socket and surrounding components should be reduced as much as possible. It may be noted that a considerable proportion of the total valve drift is due to the heating of the base, and any cooling of the valve pins through contact with cool socket contacts is very effective in reducing the drift.

The following table shows the heat dissipation of several popular converter types under typical conditions:-

Dissipation	Watts	6J8 G	6A8 G	6K8 G	6SA7
Plate		0.33	0.88	0.63	0.85
Screen		0.29	0.27	0.60	0.80
Oscillator		0.23	0.20	0.11	---
Heater		1.87	1.89	1.89	1.89
Total -	2.74	3.24	3.23	3.54	

In the calculations of the oscillator dissipation it is assumed that 70% of the input is converted into oscillatory power, and 30% is dissipated as heat in the valve. Even if this assumption is not quite accurate it will not make much difference to the final result.

It will be seen that the heater dissipation is the controlling factor, and for this reason valves have a higher heater current than 0.3 ampere at 6.3 volts are undesirable for short wave operation. Although valves have been produced with a heater current less than 0.3 amp. these have not been found to be entirely satisfactory on the short wave band, on account of emission difficulties. Radiotron 6J8G has somewhat less total heat dissipation than the other types shown in the table, and this is to its advantage as regards frequency stability.

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D I V I S I O N A L   N O T E S

- New South Wales Division -

By VK2AJO

The June meeting of the N.S.W. Division was held on the 19th at the Y.M.C.A. Buildings, Pitt Street. Two vacancies on the Council were filled by the election of Messrs. Ray Priddle VK2RA and Russ Miller. Russ has been President of the Zero Beat Radio Club for many years. The President of the Division, Frank Goyen, was congratulated - by proxy - on having been granted a commission in the Air Force, but unfortunately this has necessitated him resigning from the Council. Ray Priddle was unanimously elected to the position and the Council is now constituted:-

President	.. R. Priddle	VK2RA
Vice-Presidents	.. H. Peterson	VK2HP
	.. C. Horne	VK2AIK
Secretary	.. W. Ryan	VK2TI
Treasurer	.. W. McIlrea	VK2UV
Technical Officer	.. J. Howes	VK2ABS
Magazine	.. A. Joselyne	VK2AJO
Councillors	.. R. Miller	
	.. D. Dunn	VK2EG

The General Meeting was well attended, and had pleasure in making a further donation to the funds of "Air Force House." The lecture was delivered by Bill McIlrea, and was entitled "What happens when the shutter clicks," and judging by the range of questions fired at the lecturer ham radio contains many silent and not so silent supporters of the art of photography. 2UV was ably assisted by our old friend Joe Reed 2JR. Incidentally the cameras exhibited by both these members showed the extremes in Camera design. 2UV's exhibit was a Graflex and 2JR's one of those minatures that do everything but develop and print the negative. At a later date it is anticipated that the Council will be able to prevail upon Joe to give a Lecture on the Calypygian Venus...Ahem!

Congratulations to Bill Moore and Morry Meyers upon obtaining their Commissions in the R.A.A.F. After a long time the efforts of these chaps in organising the R.A.A.F.W.R. in New South Wales has been rewarded.

The Annual Election of the Institute Members of the New South Wales Section of the Vigilance Committee has now been completed and Messrs. Priddle, Peterson, and Ryan were chosen by the Senior Radio Inspector.

The July General Meeting of the Division will be held

at the Y.M.C.A. Buildings, Pitt Street, Sydney on Thursday 17th commencing at 8 p.m. and the subject set down for Lecture is entitled "LIGHT". A cordial invitation is extended to all Hams on service at present.

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-- WAVERLEY RADIO CLUB --

Twenty-second Annual re-union

The twenty-second Annual Re-Union of the Waverley Amateur Radio Club was held in the Club Rooms, 13 MacPherson Street, Waverley on Tuesday 3rd of June. The manner in which this Club has carried on since its inception in 1919 was favourably commented upon by all present.

The Toast of the Club was proposed by Mr. John Moyle VK2JU Editor of Radio and Hobbies, who in his remarks traced the history of the Club and its achievements from the early days right up to the present.

The Institute was represented by Messrs. Peterson and Ryan who congratulated the Club on its fine record and also its unswerving loyalty to the Institute. Other Toasts honored were those of the "W.I.A" "Hams on Service," "Foundation Members". Upon conclusion of the speeches a moving picture show was put on by two of the members. During "Interval" ham spirit was much in evidence and many tales were told -- both probable and highly improbable.

Although the number present this year was naturally smaller than on previous occasions those present unanimously voted it a great night and are looking forward to the time - let us hope in the near future - when all Hams will be able to tell of the DX they worked "Last Night" ..

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VICTORIAN DIVISION

- Attention -

The Annual General Meeting of the Victorian Division will be held at the Institute Rooms, Queen Street, on Tuesday Night, August 5th, when it is hoped that there will be a very large attendance. Besides the ordinary business of the Annual Meeting, a lecture is scheduled to be delivered by Mr. W. Holland VK9VW, which should be very, very interesting indeed.

Those who did not come along to the last meeting missed a real treat. Listed for the evening was a lecture by our old friend Gil Miles 7KQ, ex 3KQ, fortunately or unfortunately for Gil (he didn't say very much) someone got in before him and provided an evening which us "HAMS" haven't had for many a long

day. Methinks that quite a few of the gang present went home and looked very longingly at their--or what's left--of their transmitters. Lieutenant Chippendale VK3VU, and some of his men--VK3VD, VK9MW, and Rimmer of the Army Headquarters Experimental Radio Laboratories brought along a display of Army Radio Equipment, which included some RF gear, pack sets, to wit, and a Kingsley receiver, modelled on well known American makes, the performance of which was excellent. Probably the exhibit which annoyed the gang more than anything else was a number of high power 'bottles' which were--believe me or believe me not, were handled with loving care. One could almost read the thoughts - "When I get back on the air...."

During the month a letter was received from Tim Wells VK3TW of Hamilton--to quote from his letter ---

"Incidentally, hams are fairly well represented in this one horse town at the present time, there is Bill Hehir (can't think of his call) but he is pilot on Ansett Airways Airspeed Envoy, Hamilton to Melbourne. Martin Chaffer VK3XF, he is engineer on the staff of commercial 3HA, and bye the bye, Mart is to join the ranks of the benedicts on Saturday next 7th inst., the wed-ding is taking place in Melbourne. Stan Zeunart VK3SZ is still in charge of radio repairs at the Hamilton Branch of A. G. Healing. Mort Riley VK3TN is still doing a good job of work persuading prospects that the make of radio set that he sells is the best in the world. Jim Michell VK3JP is still Lands Officer for this truly rural area, and of course there is Tim VK3TW, the old man himself, so it seems that when we go back on the air again there will be a spot of QRM around this joint as all these fellows live within a radius of half a mile .... Brian Falkenburg VK3FA (aint it a shame) successfully passed the medical test for the RAAF last week. Brian is in the local Light Horse camp as a Universal Trainee and his statement that he never could get along with horses is born out by the fact that for the past week he has been enjoying his meals off the mantlepiece -- poor Brian.

You may be interested to know that I have submitted a plan to the local Federal Member whereby a chain of emergency Stations could be set up at the main towns, utilising the Hams' gear and brains to keep them operating. The details are too many to quote here but the MHR in question was impressed and is placing them before the responsible authorities. (Here's hoping).

In conclusion allow me to add my humble congratulations to you fellows in the City for your magnificent efforts in keeping the good old Mag. going under such trying circumstances. Be sure to send my copy along, and if any of the foregoing is of interest for publication purposes, then go right ahead and print it.

My kind regards to all the boys,  
Yours,

George L. D. Wells.  
VK3TW (Tim)

There are quite a number of the boys at the Barracks mainly occupied as operators in Air Force capacity. Among them is VK3YF, VK3KY, VK3KR, VK3OR.

3WE .. surprised quite a number of the boys by appearing at the last meeting -- Sgt. A. A. Williams -- to you -- at present at Broadmeadows.

3JO .. thinking of the old 5 mx field days was not content until he took a pack set up on to the roof, with 3 RN to the other end made a few tests. Someone asked which way the aerial was pointing???????. CENSORED.

3RN .. there's a bit of blackmail attached to this---Ron---as far as I can gather spends a considerable amount of time walking the floor--knows all the lullabys around the place.

3XH .. now Captain Johnson is to be located at Army Headquarters Ringwood.

3XE .. is with the R.A.A.F. abroad.

3HG .. put in an appearance at the meeting.

3BQ .. had rather a bad time at the meeting .. Max turned up while the last magazine was being printed...somehow I've an idea Max has ideas for speeding up the printing.

3DG .. is reported to be a member of the R.A.A.F. and is at present at Laverton.

3HQ .. is, I believe nursing at the Alfred Hospital. How's about making one of the meetings Marg...First Tuesday of any month.

3IK .. reports that he is indulging in Wine, Women and Song as a hobby. The neighbours don't complain about the amplifier any more, 'cause it aint no use, methinks he'll have the Malvern Council on his trail again when he starts foolin' with the Saxophone in front of the DL04.

3HX .. usually forgets himself in these notes--yes in more ways than one--some people want to know why he is late on a Saturday when the Mag. is being print' d--someone else wants to know how he writes these notes when his thoughts should be on his borders too.????

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The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

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